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EVALUATION OF THE SOUTHERN PINE BEETLE INFESTATIONS ON THE NATIONAL FORESTS OF SOUTH CAROLINA

By

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INTRODUCTION

Aerial sketch map surveys were conducted on the National Forests of South Carolina in June 1976. (Figure 1) Surveys were followed by subsequent ground examinations. These surveys covered a total of 414,701 acres on the Francis Marion National Forest and 1,059,743 acres on the Sumter National Forest. The Forest Insect and Disease Management Group conducted the surveys to determine the status and trend of southern pine beetle populations on the two National Forests.

The southern pine beetle infestations in South Carolina are part of a southwide outbreak involving 13 states. Southern pine beetle populations have been reported on all districts of the Francis Marion and Sumter National Forests since 1974.

METHODS

Fifty percent aerial sketchmap surveys were performed on the Long Cane, Edgefield, Tyger, Enoree and Andrew Pickens Ranger Districts of the Sumter National Forest and on the Wambaw and Witherbee Ranger Districts of the Francis Marion National Forest. 1/ A portion of the spots detected during the aerial phase of the evaluation were examined on the ground to confirm the cause of mortality and determine the level of activity in the infested area.

1/ Detection of Forest Pests in the Southeast. 1970. U.S.D.A., USFS, SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, GA. 51pp.

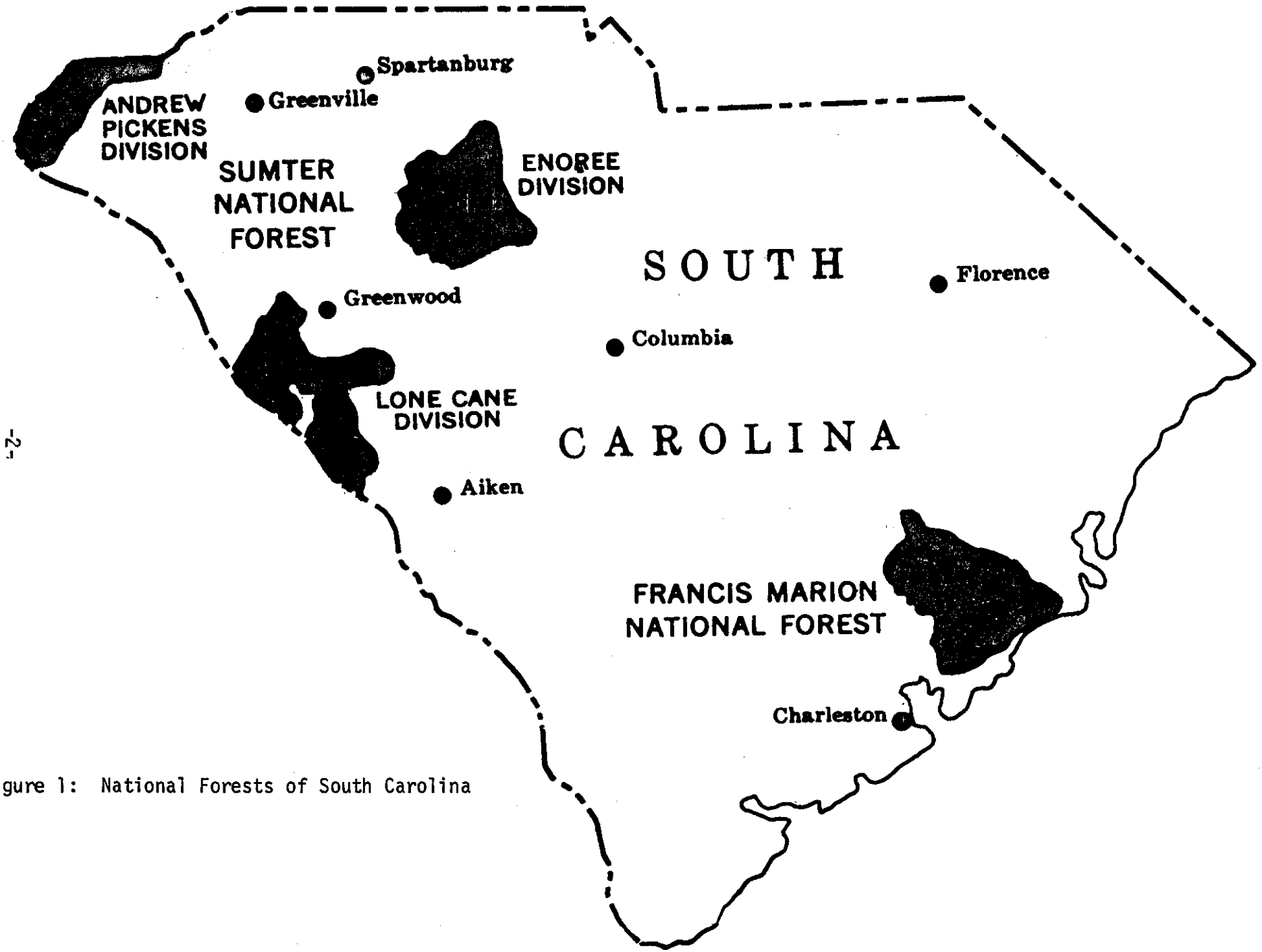

Figure 1: National Forests of South Carolina

TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

Hosts - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine and occasionally other conifers as well. Susceptible southern yellow pines include Virginia (*Pinus virginiana* Mill.), shortleaf (*P. echinata* Mill.), and pitch (*P. rigida* Mill.).

Type of Damage - Death of the tree is the result of mining in the cambium by the southern pine beetle as it constructs egg galleries. The beetle also introduces blue stain fungi, *Ceratocystis* spp., which slow down or block conduction of water in the stem. The size of an infestation may range from a single tree to several thousand trees.

Life Cycle of the Beetle - Southern pine beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark where they pupate and change into adults. The new adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as four or five generations may be produced annually in the area.

RESULTS AND DISCUSSION

Overall, southern pine beetle activity is low on the Francis Marion and Sumter National Forests. This coincides with a reported trend of declining beetle activity throughout the coastal plain and Piedmont areas of the east coast. Most districts had small scattered spots. Thirty-six percent of the spots checked on the ground were actively infested with southern pine beetle.

Tables 1-3 summarize the results of this evaluation.

The following is a narrative discussion of the southern pine beetle situation on each district.

FRANCIS MARION NATIONAL FOREST

Wambaw District - Low southern pine beetle activity was detected on the Wambaw District. Spot size ranged from 1 to 4 trees. Very little activity was found in the ground check and only 25 percent of the spots

checked were southern pine beetle related. It is estimated that there is an average of 1.8 spots per M acres of host type (h.t.) on Forest Service land and an average spot size of 1.4 trees. Approximately 4.7 cords and 208 MBF were salvaged on the district during FY-76. This reflects a continued decrease in southern pine beetle activity as reported in the 1975 biological evaluation.

Witherbee District - Infestation levels continue to decline on this district. There are an estimated 1.7 spots per M acres h.t. averaging 3.2 trees per spot. Spot size ranged from 1 to 50 trees. Most of the spots were scattered over the northwestern half of the district. Of the spots examined on the ground, 16 percent were actively infested with southern pine beetle and all were southern pine beetle related. There were an estimated 4.4 infested trees per M acres h.t. During FY-76 the district salvaged approximately 7.0 cords and 490 MBF of infested timber.

SUMTER NATIONAL FOREST

Long Cane District - Southern pine activity is low. Spot size ranged from 1 to 10 trees with the majority of the spots occurring in the central portion of the district. There are an estimated 1.6 spots per M acres h.t. with an average spot size of 3.8 trees. This reflects an increase over the number of spots reported in the 1975 biological evaluation, however, spots are considerably smaller and there are fewer infested trees. All of the spots checked on the ground were inactive.

Edgefield District - The highest southern pine beetle activity levels were detected on the Edgefield District. Spot size ranged from 1 to 150 trees. Most of the activity is concentrated in an area in the center of the district northwest of Millers Cross Roads. This accounts for the low number of spots per M acres h.t. , however, there are an estimated 16.2 actively infested trees per M acres h.t. Fifty percent of the spots checked on the ground were actively infested with southern pine beetle.

Tyger District - Infestation levels are down compared to last year. There are an average 2.4 spots per M acres h.t. with spot sizes ranging from 1 to 15 trees. There are an estimated 1.4 infested trees per M acres h.t. Fifty percent of the spots checked on the ground were actively infested with southern pine beetle. Most activity is located in the northwestern corner of the district in the Calhoun Experimental Forest and the area just south of the Experimental Forest.

Enoree District - Southern pine beetle activity has continued to decline. There are an average 2.6 spots per M acres h.t. These average 1.5 trees per spot. Spots are small, ranging from 1 to 6 trees. Fifty percent of the spots checked on the ground were actively infested.

Andrew Pickens - The number of spots, 3.4 per M acres h.t., has increased over last year on the Andrew Pickens District, however, the overall population has declined. Average spot size has dropped from 5 to 3.4 trees and the estimated number of infested trees per M acres h.t. dropped from 40.3 in 1975 to 7.3 this year. Spot sizes ranged from 1 to 8 trees. Most spots were scattered throughout the southern half of the district. Sixty-six percent of the spots checked on the ground were actively infested.

RECOMMENDATIONS

Southern pine beetle populations are low on the Francis Marion and Sumter National Forests. Based on the information obtained for this biological evaluation, the continuing decline of activity throughout most of the South Carolina area, and the presuppression and suppression activities reported by the districts during the past year, it is recommended that the Southern Pine Beetle Projects be terminated on the following districts:

Francis Marion National Forests* -	Witherbee District
	Wambaw District
Sumter National Forest -	Long Cane District
	Tyger District
	Enoree District
	Andrew Pickens District

It is recommended that the Southern Pine Beetle Project be continued on the Edgefield District, Sumter National Forest. This district should continue suppression measures for southern pine beetle in accordance with the Southern Pine Beetle Control Plan for the National Forests of South Carolina and FSM 5250.

*The Witherbee and Wambaw Districts reported the most timber salvaged July 1976 through July 1976, however, the low beetle populations and the trend for decreasing activity along the coastal areas indicate that Southern Pine Beetle Projects will not be necessary for the next fiscal year.

REFERENCES

Thompson, J. H., W. E. McDowell, and R. E. Brooks. 1975. Evaluation of southern pine beetle infestations on the Francis Marion and Sumter National Forests, South Carolina. U.S.D.A., For. Serv., SA, S&PF, Forest Insect and Disease Management Group. Rept. No. 76-1-6.

Table 1: Summary of the results of the southern pine beetle evaluations conducted on the Francis Marion National Forest, South Carolina, 1976.

	Ownership Unit	
	Wambaw RD	Witherbee RD
1. Results compiled from data collected during the aerial phase of the evaluation:		
Survey type	Sketch map	Sketch map
Date of aerial survey	6-18-76	6-18-76
Percent survey	50%	50%
Total acreage surveyed	165,700	249,000
Total acreage of Forest Service land	130,686	128,097
Susceptible host type acreage of Forest Service land	76,113	87,986
Total number of spots within the survey boundary	143	161
Total number of spots on Forest Service lands	137	150
Spots per M acre of host type Forest Service lands	1.8	1.7
Average spot size (trees) Forest Service lands	1.4	3.2
Range of spot sizes (trees) Forest Service lands	1-4	1-50
Reds and faders/M acres host type on Forest Service lands	2.5	5.5
2. Results compiled from data collected during the ground and aerial phases of the evaluation:		
Date of ground phase	6-30-76	6-29-76
Infested trees per M acre of host type Forest Service lands	-	4.4
Total number of infested trees on Forest Service lands	-	382
Total volume of infested trees on Forest Service lands	-	36.3 MBF
Total number of affected trees on Forest Service lands	438	692
Total volume of affected trees on Forest Service lands	53.6 MBF	79.6 MBF
Ratio of green infested to total red and fading trees	-	2:19

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

Table 2a: Summary of data for the Long Cane and Edgefield Ranger Districts of the Sumter National Forest, South Carolina, 1976.

	Ownership Unit	
	Long Cane RD	Edgefield RD
1. Results compiled from data collected during the aerial phase of the evaluation:		
Survey type	Sketch map	Sketch map
Date of aerial survey	6-25-76	6-24-76
Percent survey	50%	50%
Total acreage surveyed	208,244	194,237
Total acreage of Forest Service land	50,216	78,356
Susceptible host type acreage of Forest Service land	44,075	72,227
Total number of spots within the survey boundary	91	138
Total number of spots on Forest Service lands	68	41
Spots per M acre of host type Forest Service lands	1.6	0.7
Average spot size (trees) Forest Service lands	3.8	38.6
Range of spot sizes (trees) Forest Service lands	1-10	1-150
Reds and faders/M acres host type on Forest Service lands	5.9	27.5
2. Results compiled from data collected during the ground and aerial phases of the evaluation:		
Date of ground phase	7-7-76	7-1-76
Infested trees per M acre of host type Forest Service lands	-	16.2
Total number of infested trees on Forest Service lands	-	936
Total volume of infested trees on Forest Service lands	-	79.6 MBF
Total number of affected trees on Forest Service lands	391	3,317
Total volume of affected trees on Forest Service lands	62.9 MBF	281.9 MBF
Ratio of green infested to total red and fading trees	-	1:4.6

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

Table 2b: Summary of the results of the southern pine beetle evaluations conducted on the Tyger, Enoree and Andrew Pickens Ranger Districts of the Sumter National Forest, South Carolina, 1976.

	Ownership Unit		
	Tyger RD	Enoree RD	Andrew Pickens RD
1. Results compiled from data collected during the aerial phase of the evaluation:			
Survey type	Sketch map	Sketch map	Sketch map
Date of aerial survey	6-18-76	6-18-76	7-20-76
Percent survey	50%	50%	50%
Total acreage surveyed	205,765	194,237	128,741
Total acreage of Forest Service land	78,709	78,356 119089	72,553
Susceptible host type acreage of Forest Service land	65,072	72,227	46,566
Total number of spots within the survey boundary	247	243	195
Total number of spots on Forest Service lands	153	187	156
Spots per M acre of host type Forest Service lands	2.4	2.6	3.4
Average spot size (trees) Forest Service lands	3.4	1.5	2.9
Range of spot sizes (trees) Forest Service lands	1-15	1-6	1-8
Reds and faders/M acres host type on Forest Service lands	7.9	4.0	9.8
2. Results compiled from data collected during the ground and aerial phases of the evaluation:			
Date of ground phase	7-7-76	7-8-76	7-21-76
Infested trees per M acre of host type Forest Service lands	1.4	2.0	7.3
Total number of infested trees on Forest Service lands	88	144	342
Total volume of infested trees on Forest Service lands	7.6 MBF	20.4 MBF	39.3 MBF
Total number of affected trees on Forest Service lands	582	287	483.4
Total volume of affected trees on Forest Service lands	47.7 MBF	38.7 MBF	154.6 MBF
Ratio of green infested to total red and fading trees	-	-	-

Volume - BF - based on Scribner decimal C log rule. Cords converted to bd. ft. based on 500 bd. ft. per cord.

Table 3 -- Summary of Aerial Survey Data - 1/ Southern Pine Beetle Evaluation on the Francis Marion and Sumte. National Forests, South Carolina, 1976.

Ownership	Infestation Size (# Trees)											
		2-5		6-20		21-50		50+100		100+		Total
	Singles	Spots	Trees	Spots	Trees	Spots	Trees	Spots	Trees	Spots	Trees	Spots	Trees
Francis Marion NF												
Witherbee RD	87	50	138	9	95	3	164	-		-		150	484
Wambaw RD	112	25	75	-		-		-		-		137	188
Sumter NF												
Andrew Pickens RD	37	109	349	10	70	-		-		-		156	456
Edgefield RD	12	13	26	5	30	11	346	3	240	6	930	41	1585
Long Cane RD	25	24	84	19	152	-		-		-		68	261
Enoree RD	138	44	119	5	30	-		-		-		153	515
Tyger RD	62	81	259	10	194	-		-		-		187	287

1/ Corrected and expanded to 100%